Sensor Network Module Evaluation Kit

Introduction
Serving the Growing Environment & Energy Markets

Smart Networks

Sensors + Communication Modules × Integration Technology
Sensor Network Module Concept

Motion and Environment Sensor and RF in a Ultra Tiny package

Environment Sensors

- UV/Ambient Light Sensor
- Humidity/Temp Sensor
- Pressure Sensor

Motion Sensor
- 6 DOF Geomagnetic/Accelerometer Sensor

Communication
- BT SMART w/ ANT

Dimension: 5.6mm x 18.5mm
# Sensor Network Module

## Specifications

<table>
<thead>
<tr>
<th>Sensor Network Module</th>
<th>Unit</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>[V]</td>
<td>2.35~3.30V</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>[mA]</td>
<td>7mA @Peak</td>
</tr>
</tbody>
</table>

**Bluetooth® 4.1 LE**

<table>
<thead>
<tr>
<th>Unit Specifications</th>
<th>[dBm]</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver Sensitivity</td>
<td>-93</td>
<td></td>
</tr>
<tr>
<td>Transmit Power</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**6 DOF Sensor**

<table>
<thead>
<tr>
<th>Measurement Range</th>
<th>[mT] / [g]</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geo-Mag.</td>
<td>-2.4~+2.4</td>
<td></td>
</tr>
<tr>
<td>Acc.</td>
<td>-16~+16G</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>[uT/LSB] / [mg/LSB]</td>
<td>Specifications</td>
</tr>
<tr>
<td>Geo-Mag.</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Acc.</td>
<td>0.98</td>
<td></td>
</tr>
</tbody>
</table>

**Pressure Sensor**

<table>
<thead>
<tr>
<th>Measurement Range</th>
<th>[hPa]</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>300~1100</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>[hPa/LSB]</td>
<td>Specifications</td>
</tr>
<tr>
<td></td>
<td>0.013</td>
<td></td>
</tr>
</tbody>
</table>

**Humidity/Temperature Sensor**

<table>
<thead>
<tr>
<th>Measurement Range</th>
<th>[%RH] / [ºC]</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hum.</td>
<td>0~100</td>
<td></td>
</tr>
<tr>
<td>Temp.</td>
<td>-20~+85</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>[%RH/LSB] / [ºC/LSB]</td>
<td>Specifications</td>
</tr>
<tr>
<td>Hum.</td>
<td>0.016</td>
<td></td>
</tr>
<tr>
<td>Temp.</td>
<td>0.02</td>
<td></td>
</tr>
</tbody>
</table>

**UV-A/Ambient Sensor**

<table>
<thead>
<tr>
<th>Measurement Range</th>
<th>[mW/cm2] / [Lx]</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV-A</td>
<td>0~20.48</td>
<td></td>
</tr>
<tr>
<td>Ambient</td>
<td>0~81900</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>[mW/cm2]/LSB / [Lx]/LSB</td>
<td>Specifications</td>
</tr>
<tr>
<td>UV-A</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>Ambient</td>
<td>0.02</td>
<td></td>
</tr>
</tbody>
</table>
New Evaluation Kit for Ease of Testing

Enabling Ease of design for IOT Product: Sensor Network Module

- Using Bluetooth™ Smart
  - Long Battery life

- On-Board Microcontroller
  - Enabling ease of Sensor control and management, including lower power consumption

- Various Sensor Used
  - Temperature/ Humidity, UV/ Ambient Light, Pressure, 6 Axis (Accelerometer/ Geomagnetic) sensors

- Ultra Compact Module
  - 18.5mm x 5.6mm x 3.4mm for wide range of use cases, including wearables

- Easy to Use

- For a Safer Working Environment

- For Fitness and Healthcare

- On Sale in Europe

- Front

- Back

- Various Sensor Used
  - Temperature/ Humidity, UV/ Ambient Light, Pressure, 6 Axis (Accelerometer/ Geomagnetic) sensors

- Ultra Compact Module
  - 18.5mm x 5.6mm x 3.4mm for wide range of use cases, including wearables
Descriptions of Sensor

- **Environment Sensors**
  - Temp. / Humidity Sensor
  - UV/ Ambient Light Sensor
  - Pressure Sensor

- **Motion Sensors**
  - 6 Axis Sensors (Accel. + Geo-mag)

App Functions

- Each Sensor ON/OFF
- Sleep Mode Settings
- Display data in Graph form
- Sensor Interval Settings
- Normal and Beacon Mode Settings

Switch on and Go

Easy Sensor Settings
Sensor Network Module Evaluation Kit

ALPS Sensor GRAPH

SNM00 (BB:00:00:00:00:22) 3.15[V]

Measuring Mode
- Slow Mode

Measuring Intervals
- Slow Mode [sec]
  - 1

- Magnetic(X=0, Y=0, Z=0)[uT]
- Acceleration(X=0.00, Y=0.00, Z=0.00)[G]
- UV=0.0[mW/cm²]
- AmbientLight=0.0[Lx]
- Humidity=0.0[%RH]
- Temperature=0.0[°C]

LOGGING ON

Sampling Sensors
- Magnetic
- Acceleration
- UV
- Ambient Light
- Humidity
- Temperature
- Pressure

ALPS Sensor GRAPH

SNM00 (AA:AA:AA:AA:AA:11)

Acceleration and Magnetic

Pressure
1. Use Case
   Agriculture ICT for weather monitoring, Infrastructure equipment for detecting irregularities etc.

2. Sensor Data Used
   6 Axis Sensor for vibration detection
   Humidity/ Temperature, UV/ Ambient light and Pressure sensors for weather data

3. System Construction
   Sensor ⇒ Gateway ⇒ Cloud ⇒ Operator
Application Example: Smart Maintenance

1. Use Case
   Irregularity detection for prevention maintenance

2. Sensor Data Used
   Humidity/ Temperature for overheat detection
   6 Axis Sensors for vibration detection
   Pressure Sensor for air pressure monitoring in Clean Room

3. System Construction
   Sensor ⇒ Gateway ⇒ Cloud
   ⇒ Supervisor

xEMS
1. Use Case
   Helmet Condition Care

2. Sensor Data Used
   - 6 Axis Sensor for faint/ fall check
   - Humidity/ Temperature and UV/ Ambient light Sensor for heat exhaustion check

3. System Construction
   Sensor ⇒ Smartphone ⇒ Cloud ⇒ Back Office
Components of the Module
Bluetooth Smart w/ Antenna

Specifications

Spec: Bluetooth SMART
Freq: 2402-2480MHz
Chip Set: DA14580
I/F: UART / SPI / I2C Interface
Power supply: Supports coin (typ 3.0V) and alkaline (typ 1.5V) battery cells.
Others: 16 MHz crystal, 32 KHz crystal is embedded.
Current Cons. : Rx / Tx peak 5 mA
Sleep 0.6μA

Features

Very Small and Thin Package
Low Power Consumption

Application
DSC, Printer, Cellular, PDA, POS, etc

Ready to mass production
6-axis (Mag.+Acc.) sensor

HSCDHD005A

Applications
- E-Compass
- Motion Sensing
- Game Controller

Features
- 6DOF (Mag. + Acc.) with Low Current Consumption
  - Principal:
    - Magnetometer: GMR
    - Accelerator: Capacitive
  - Package Size: 2.0 x 2.0 x t0.95mm
  - I/F: I2C
  - Current Consumption: 150uA@Active
  - Wide Dynamic Range:
    - Magnetometer: +/- 2.4mT
    - Accelerator: +/-2,4,8,12,16G

<table>
<thead>
<tr>
<th>ALPS</th>
<th>Comp.C</th>
<th>Comp.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle</td>
<td>Mag GMR Acc Capacitive</td>
<td>FG&amp;Hall Capacitive</td>
</tr>
<tr>
<td>Size [mm]</td>
<td>2.0x2.0x0.95 12LGA</td>
<td>2.2x2.2x0.95 12LGA</td>
</tr>
<tr>
<td>Current Consumption (10Hz,2.5V)</td>
<td>150uA@Active 5uA@Sleep</td>
<td>500uA@Act 1uA@Sleep</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>Mag +/- 2.4mT Acc +/- 2,4,8,12,16G</td>
<td>XY±1.3 mT, Z±2.5mT +/-2,4,8,16G</td>
</tr>
<tr>
<td>Resolution (8G)</td>
<td>Mag 0.15uT Acc 1mg/LSB</td>
<td>0.30uT 4mg/LSB</td>
</tr>
<tr>
<td>Voltage</td>
<td>1.7~3.6V</td>
<td>1.6~3.6V</td>
</tr>
</tbody>
</table>

Applications
- E-Compass
- Motion Sensing
- Game Controller

Standard Product
Pressure Sensor (digital)

The lowest noise level in industry in a compact package.

**Features**
- Small Package Size
- 16 bit Digital Output
- Supply voltage 1.8 to 3.6 V
- 30 to 110 kPa
- Lead free, RoHS instruction, halogen free conforming

**Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution [kPa]</td>
<td>0.001 (0.08m)</td>
</tr>
<tr>
<td>Size [mm]</td>
<td>2.5 x 2.5 x 0.8 (typ.)</td>
</tr>
</tbody>
</table>

**Applications**
- Smart phone
- Enhancement navigation for GPS
- Weather forecast & Information
- Vertical velocity indication

HSPPAD Series

New Product
UV sensor

Detects various types of light in a single package

HSVDDD003A(UV-A/ambient)
HSVDDD002A(UV-A/B)
HSVDDD002B(UV-B/ambient)

Features

- 3 variety
- Small Package Size UV sensor
- 12 bit Digital Output

Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital interface</td>
<td>I2C</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>1.8 to 3.6 V</td>
</tr>
<tr>
<td>Current consumption (active)</td>
<td>200 uA</td>
</tr>
<tr>
<td>Current consumption (sleep)</td>
<td>5 uA</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>-30 to 85 °C</td>
</tr>
<tr>
<td>Measurement range [UV]</td>
<td>0 to 10 mW/cm²</td>
</tr>
<tr>
<td></td>
<td>[Ambient light] 0 to 100,000 lx</td>
</tr>
<tr>
<td>Sensitivity [UV]</td>
<td>2.5 uW/cm²/LSB</td>
</tr>
<tr>
<td></td>
<td>[Ambient light] 25 lx/LSB</td>
</tr>
</tbody>
</table>

Applications

- Healthcare skincare and heat stroke prevention
- Smartphone indoor/outdoor detection skincare and heat stroke prevention
Humidity/Temperature Sensor (digital)

The world's smallest humidity sensor

HSHCAL001B

1.0mm (Max)

2mm

2mm

Features
- Stable Capacitive type sensor
- Temperature measurement capability
- Small foot print
- Low current consumption 140uA@10Hz

Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Spec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity Type</td>
<td>[ - ]</td>
<td>Relative Humidity</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>[V]</td>
<td>1.8 (1.71~1.89)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>[ºC]</td>
<td>-20 ~ 85</td>
</tr>
<tr>
<td>Measurement Humidity Range</td>
<td>[%RH]</td>
<td>0 ~ 100</td>
</tr>
<tr>
<td>Humidity Resolution</td>
<td>[%RH]</td>
<td>0.015</td>
</tr>
<tr>
<td>Humidity Accuracy</td>
<td>[%RH]</td>
<td>+/-1.5 @ 25ºC/50%RH</td>
</tr>
<tr>
<td>Measurement Temp Range</td>
<td>[ºC]</td>
<td>-20 ~ 85</td>
</tr>
<tr>
<td>Temperature Resolution</td>
<td>[ºC]</td>
<td>0.02</td>
</tr>
<tr>
<td>Temperature Accuracy</td>
<td>[ºC]</td>
<td>+/-0.5 @ 25ºC</td>
</tr>
<tr>
<td>Interface</td>
<td>[ - ]</td>
<td>I2C</td>
</tr>
</tbody>
</table>

Applications
- Smart phone / Tablet
- PC
- Environmental sensor module
Pursuit of the ultimate in fine electronic devices. ALPS creates new values that satisfy stakeholders and are friendly to the earth.